
DEVELOPMENT OF NATURAL AND SOCIAL SCIENCES SUPPLEMENTARY TEACHING MATERIALS BASED ON WEST KALIMANTAN LOCAL WISDOM ON THE TOPIC OF INTRODUCTION TO ANIMALS AND PLANTS FOR FOURTH GRADE ELEMENTARY SCHOOL STUDENTS

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ABSTRACT

The limited availability of teaching materials for the Natural and Social Sciences (IPAS) subject that integrate the local wisdom of West Kalimantan has resulted in the learning process for topics on animals and plants in elementary schools being less contextual and less engaging for students. This study aims to describe the development process, feasibility, and readability of a local wisdom-based IPAS teaching supplement on the topic of identifying animals and plants for fourth-grade elementary school students. The study employed the Research and Development (R&D) method using the ADDIE model, limited to the analysis, design, and development stages. The research subjects consisted of six expert validators (two subject matter experts, two language experts, and two design experts) as well as fourteen fourth-grade students from Class IV B at SD Negeri 42 Pontianak Kota who served as respondents for the readability test. Data were collected through interviews, Likert-scale questionnaires, and field notes, then analyzed using qualitative and quantitative descriptive methods, including the Borich formula (Percentage of Agreement) and the readability percentage formula. The results showed that the developed instructional supplement achieved a suitability percentage of 93.6% from subject matter experts, 98.1% from language experts, and 95.4% from design experts, all of which fell into the “highly suitable” category. The readability test results for students showed a percentage of 92%, falling into the “very good” category. These findings indicate that the local wisdom-based instructional supplement which features animals and plants native to West Kalimantan, such as the hornbill, arowana fish, and tengkawang tree is suitable for use as a resource to support IPAS learning that is more contextual, engaging, and easily understood by elementary school students.

Keywords: development, teaching materials, local wisdom, IPAS, elementary school

ABSTRAK

Keterbatasan bahan ajar mata pelajaran Ilmu Pengetahuan Alam dan Sosial (IPAS) yang mengintegrasikan kearifan lokal Kalimantan Barat menyebabkan proses pembelajaran materi mengenal hewan dan tumbuhan di sekolah dasar kurang kontekstual dan kurang menarik minat peserta didik. Penelitian ini bertujuan untuk mendeskripsikan proses pengembangan, tingkat kelayakan, dan tingkat keterbacaan suplemen bahan ajar IPAS berbasis kearifan lokal pada materi mengenal hewan dan tumbuhan bagi peserta didik kelas IV sekolah dasar. Penelitian menggunakan metode Research and Development (R&D) dengan model ADDIE yang dibatasi pada tahap analisis (analyze), desain (design), dan pengembangan (development). Subjek penelitian terdiri atas enam orang validator ahli (dua ahli materi, dua ahli bahasa, dan dua ahli

desain) serta empat belas peserta didik kelas IV B SD Negeri 42 Pontianak Kota sebagai responden uji keterbacaan. Data dikumpulkan melalui wawancara, angket berskala Likert, dan catatan lapangan, kemudian dianalisis secara deskriptif kualitatif dan kuantitatif menggunakan rumus Borich (Percentage of Agreement) serta rumus persentase keterbacaan. Hasil penelitian menunjukkan bahwa suplemen bahan ajar yang dikembangkan memperoleh persentase kelayakan sebesar 93,6% dari ahli materi, 98,1% dari ahli bahasa, dan 95,4% dari ahli desain, yang seluruhnya berada pada kategori sangat layak. Hasil uji keterbacaan terhadap peserta didik menunjukkan persentase 92% dengan kategori sangat baik. Temuan ini mengindikasikan bahwa suplemen bahan ajar berbasis kearifan lokal yang memuat hewan dan tumbuhan khas Kalimantan Barat, seperti burung enggang, ikan arwana, dan pohon tengkawang, layak digunakan sebagai pendukung pembelajaran IPAS yang lebih kontekstual, menarik, dan mudah dipahami peserta didik sekolah dasar.

Kata Kunci: pengembangan, bahan ajar, kearifan lokal, IPAS, sekolah dasar

INTRODUCTION

Elementary education plays a strategic role in shaping students' basic knowledge, attitudes, and skills from an early age, including in the Natural and Social Sciences (IPAS) subject, which is the result of combining the Natural Sciences (IPA) and Social Sciences (IPS) subjects in the Merdeka Curriculum. In the fourth grade of elementary school, the IPAS Phase B Learning Outcomes (CP) emphasize that students are expected to be able to describe biodiversity, cultural diversity, local wisdom, and conservation efforts. This requirement underscores that learning about animals and plants cannot be separated from the environmental and cultural context of the students' communities.

Instructional materials are a key component determining the success of the learning process¹. Kosasih states that instructional materials are resources used by both teachers and students to facilitate the learning process², while Ramadhani emphasizes that instructional materials encompass content, methods, guidelines, and assessment techniques used to achieve

¹Akhmad Abdillah dkk., "Pengembangan Buku Suplemen dengan Teknologi 3D Augmented Reality sebagai Bahan Belajar Tematik untuk Siswa Kelas 4 SD," *JINOTEP (Jurnal Inovasi dan Teknologi Pembelajaran): Kajian dan Riset Dalam Teknologi Pembelajaran* 6, no. 2 (2020): 111–18, <https://doi.org/10.17977/um031v6i22020p111>; Arif Afandi, "Pengembangan Kurikulum Pendidikan Agama Islam Melalui Bahan Ajar PAI Berbasis TIK," *Attanwir : Jurnal Keislaman dan Pendidikan* 13, no. 2 (2022): 197–206, <https://doi.org/10.53915/jurnalkeislamanpendidikan.v13i2.208>; Nurhaningtyas Agustin dkk., "Pengembangan Bahan Ajar Pembelajaran Tematik Berbasis Multiple Intelligences di Madrasah Ibtidaiyah," *At-Thullab : Jurnal Pendidikan Guru Madrasah Ibtidaiyah* 5, no. 2 (2022): 101–101, <https://doi.org/10.30736/atl.v5i2.562>; Mohammad Donny Andreyanto dkk., "Nilai Pendidikan Karakter dalam 20 Fabel Motivasi Pembentuk Karakter Karya Muiyassaroh sebagai Bahan Ajar SMP," *Sasindo* 10, no. 2 (2023), <https://doi.org/10.26877/sasindo.v10i2.14542>; Novia Rahmianti dkk., "Pengembangan Bahan Ajar Bahasa Indonesia berbasis permainan dalam keterampilan menyimak peserta didik fase A di Sekolah Dasar Labschool Cibubur," *Jurnal Konatif: Jurnal Ilmiah Pendidikan* 1, no. 1 (2023), <https://doi.org/10.62203/jkjp.v1i1.9>.

²E. Kosasih, *Pengembangan Bahan Ajar* (Bumi Aksara, 2021).

specific competencies³. Zahyuni and Nuraini further assert that instructional materials should ideally be adaptable to local culture so that the content presented is not only relevant but also reinforces students' cultural identity. This principle of culturally responsive teaching serves as a crucial foundation for developing contextually relevant instructional materials, including those focused on learning about animals and plants⁴.

Local wisdom comprising the values, knowledge, customs, and cultural practices of local communities passed down through generations holds great potential for integration into IPAS learning. West Kalimantan possesses unique biological and cultural riches, such as the hornbill considered sacred by the Dayak people the arowana fish, a high-value commodity and symbol of good fortune; the estuarine crocodile, closely tied to local folklore; the tengkawang tree, a source of vegetable oil; and the belian tree (ironwood), used in the construction of traditional houses. These various resources serve as authentic learning materials that can bridge IPAS concepts with students' real-life daily experiences.

A preliminary study conducted at SD Negeri 42 in Pontianak City revealed that IPAS instruction for fourth-grade students has so far relied primarily on textbooks and Student Worksheets (LKS) as the main learning resources. Interviews with the fourth-grade B teacher indicated that students tend to get bored quickly when instruction focuses solely on general textbooks with minimal connection to their surrounding environment. Teachers believe that integrating local wisdom into IPAS teaching materials is essential so that students can understand the material through contexts they recognize in their daily lives. The results of a needs assessment survey of students reinforced these findings: 91% of students stated they enjoyed studying IPAS, yet 28% of them admitted they had never studied Pontianak culture in those lessons. A total of 91% of students expressed interest in learning about Pontianak culture, 88% stated they were more enthusiastic about learning when West Kalimantan folktales were included in the teaching materials, 78% preferred teaching materials with bright colors, and another 78% wanted the use of images, videos, or stories in their lessons.

The curriculum analysis also revealed that the textbooks and worksheets used in schools do cover basic concepts regarding animals and plants, but their presentation remains general and does not fully support the achievement of the Competency Standards (CPs) that emphasize biodiversity and local wisdom. Examples of flora and fauna unique to West Kalimantan, such

³D. Ramadhani dkk., "Pengembangan bahan ajar interaktif berbasis digital untuk sekolah dasar," *Jurnal Inovasi Pendidikan Dasar* 10, no. 1 (2024): 33–41.

⁴F. Zahyuni dan A. Nuraini, "Pengembangan bahan ajar kontekstual berbasis budaya lokal," *Jurnal Pendidikan Karakter* 13, no. 2 (2024): 55–64.

as the hornbill, the arowana fish, and the tengkawang tree, are not yet widely included in the available teaching materials. The presentation of the material is still dominated by text with limited illustrations, making it less engaging for elementary school students who, psychologically, are still in the concrete operational stage and find it easier to understand concepts through images and real-life experiences.

A number of previous studies have examined the development of teaching materials based on local wisdom in various contexts and have shown positive results. Malihah developed teaching materials based on local wisdom that were proven to increase the engagement of elementary school students because the material presented was closely tied to their cultural experiences⁵. Sriyati found that teaching materials based on local wisdom can improve students' problem-solving skills in science learning⁶, while Suryanti reported that similar teaching materials effectively improve the science literacy of elementary school students⁷. Umiroh and Rahmi also developed "big book" media based on the local culture of Riau, which proved to be suitable for use and sparked students' interest in learning⁸. Nevertheless, research specifically focused on developing teaching material supplements based on the local wisdom of West Kalimantan for the "Getting to Know Animals and Plants" curriculum for fourth-grade elementary school students remains very limited; thus, this gap justifies the need for this development study.

Based on the above description, this study aims to (1) describe the process of developing IPAS teaching material supplements based on the local wisdom of West Kalimantan for the "Getting to Know Animals and Plants" curriculum for fourth-grade elementary school students, (2) to determine the feasibility of these teaching material supplements based on evaluations by subject matter experts, language experts, and design experts, and (3) to determine the readability of the product based on the results of pilot testing with students. The results of this study are expected to contribute by providing contextual

⁵S. Malihah dkk., "Pengembangan bahan ajar berbasis kearifan lokal untuk meningkatkan keterlibatan peserta didik sekolah dasar," *Jurnal Pendidikan Dasar* 15, no. 1 (2024): 55–67.

⁶S. Sriyati dkk., "Local wisdom-based teaching materials to improve student problem-solving skills in science learning," *Bioedukatika: Journal of Science Education* 11, no. 2 (2023): 188–98, <https://doi.org/10.26555/bioedukatika.v11i2.31823>.

⁷S. Suryanti, "Local wisdom-based teaching material for enhancing primary students' scientific literacy skill," *Jurnal Pendidikan Dasar dan Pembelajaran (JPDP)* 13, no. 4 (2023): 120–29, <https://doi.org/10.21831/jpdp.v13i4.57869>.

⁸A. N. Umiroh dan L. Rahmi, "Development of big book media on songket weaving activities in Riau for elementary school," *Inovasi Kurikulum* 22, no. 3 (2025): 1227–42, <https://doi.org/10.64014/jik.v22i3.66>.

learning resources for teachers and students, while also enriching the body of research on the development of teaching materials based on local wisdom at the elementary school level.

A review of similar studies indicates that the integration of local wisdom into teaching materials has been widely developed at various educational levels and in diverse regional contexts, though with varying cultural content. Nurhayati developed worksheets based on the local wisdom of Bojonegoro batik motifs to enhance the critical thinking skills of elementary school students⁹, while Rahmat and Fadlan developed mathematics teaching materials rooted in the culture of South Tapanuli that were shown to boost learning motivation¹⁰. In the context of West Kalimantan, Amiruddin examined the community's traditional knowledge in environmental management¹¹; Arkanudin discussed shifts in the cultural values of the Dayak community¹²; and Nuryanti researched the socialization of shifting cultivation practices based on local wisdom in the same region¹³. This cultural and biological richness underscores that West Kalimantan holds great potential as a source for developing contextual teaching materials; however, its utilization in elementary school IPAS (Integrated Science, Arts, and Social Studies) curriculum particularly in lessons on identifying animals and plants has yet to be specifically examined.

In addition to cultural content, studies on the quality of teaching materials in terms of graphic design and readability are also a key focus in development research. Novianti demonstrated that interactive multimedia teaching materials based on science literacy can enhance elementary school students' understanding of science concepts¹⁴, while Pane and Sugiharti reported that problem-based teaching materials can improve students' learning outcomes and motivation¹⁵. Rahmawati and Nurhadi, as well as Purnamasari and Nurhaeni,

⁹A. Nurhayati dkk., "Pengembangan LKPD berbasis nilai kearifan lokal motif Batik Bojonegoro untuk meningkatkan kemampuan berpikir kritis siswa SD," *Jurnal Basicedu* 6, no. 5 (2022): 8959–70, <https://doi.org/10.31004/basicedu.v6i5.3986>.

¹⁰M. Rahmat dan M. N. Fadlan, "Pengembangan bahan ajar matematika menggunakan model Quantum Learning berbasis budaya Tapanuli Selatan terhadap motivasi belajar siswa kelas V," *Jurnal Riset dan Inovasi Pendidikan* 3, no. 4 (2024): 112–23, <https://doi.org/10.31004/jerkin.v3i4.912>.

¹¹Amiruddin, "Pengetahuan tradisional masyarakat Pulau Mandangin dalam pengelolaan lingkungan," *Jurnal Ilmu Sosial* 18, no. 2 (2022): 145–56.

¹²A. Arkanudin, "Perubahan orientasi nilai budaya masyarakat Dayak di Kalimantan Barat," *IDEAS Journal* 10, no. 3 (2024): 691–700, <https://doi.org/10.32884/ideas.v10i3.1799>.

¹³A. Nuryanti, "Sosialisasi pembukaan lahan perladangan berbasis kearifan lokal di Kalimantan Barat," *Jurnal Pengabdian/PKM* 8, no. 2 (2024): 55–63, <https://doi.org/10.55338/jpkmn.v5i3.3835>.

¹⁴N. M. D. Novianti dkk., "Bahan ajar interaktif multimedia berbasis literasi sains pada muatan IPA kelas V sekolah dasar," *Mimbar Ilmu* 27, no. 3 (2022): 399–408, <https://doi.org/10.23887/mi.v27i3.52635>.

¹⁵R. F. Pane dan G. Sugiharti, "Penggunaan bahan ajar berbasis masalah terhadap peningkatan hasil belajar dan motivasi siswa pada materi laju reaksi," *Jurnal Teknologi Pendidikan* 8, no. 2 (2023): 45–56, <https://doi.org/10.33394/jtp.v7i2.5663>.

also emphasized that integrating local wisdom into elementary school thematic teaching materials can enhance students' engagement in learning¹⁶. These findings reinforce the basic assumption of this study, namely that teaching materials that link scientific concepts to local cultural and environmental contexts tend to result in more meaningful and easily understandable learning for elementary school students. Therefore, the development of teaching material supplements based on the local wisdom of West Kalimantan on the topic of identifying animals and plants is essential to complement the learning resources already available in schools.

RESEARCH METHOD

This study employed the research and development (R&D) method, which is a process conducted to produce new products or improve existing ones¹⁷. The development model used is the ADDIE model, which consists of five stages: Analyze, Design, Development, Implementation, and Evaluation¹⁸. The ADDIE model was chosen because it offers a structured, systematic, and interconnected process across stages, making it suitable for the development of instructional materials. Due to limitations in time, manpower, and budget, this study was restricted to the Development stage, while the readability test was conducted as part of the product refinement during that stage. The sequence of the ADDIE stages applied in this study is presented in Figure 1.

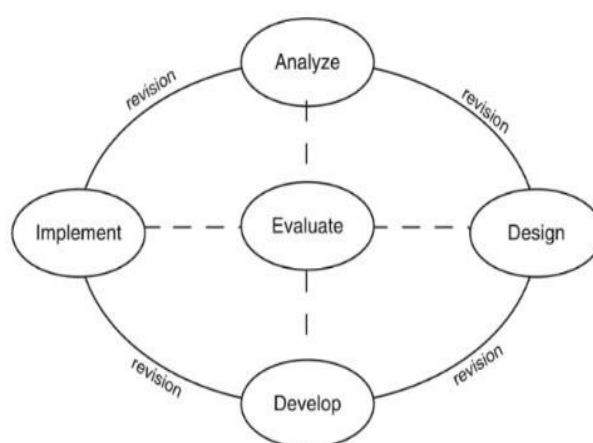


Figure 1. ADDIE Model Diagram¹⁹

¹⁶D. Rahmawati dan A. Nurhadi, "Integrasi kearifan lokal dalam bahan ajar tematik sekolah dasar," *Jurnal Inovasi Pendidikan* 9, no. 1 (2021): 33–42; D. Purnamasari dan S. Nurhaeni, "Integrasi kearifan lokal dalam bahan ajar untuk meningkatkan keterlibatan siswa," *Jurnal Inovasi Pendidikan* 9, no. 3 (2021): 188–97.

¹⁷P. Loso, *Metode Penelitian Dan Pengembangan (R&D) Dalam Pendidikan* (Prenada Media, 2024).

¹⁸R. M. Branch, *Instructional design: The ADDIE approach* (Springer, 2009).

¹⁹Branch, *Instructional design: The ADDIE approach*.

The research subjects consisted of two groups. The first group comprised six expert validators two subject matter experts, two language experts, and two design experts selected based on academic and professional backgrounds aligned with the field being validated. The evaluation by two experts in each field was intended to ensure more objective validation results. The second group consisted of fourteen fourth-grade students from Class IV B at SD Negeri 42 Pontianak Kota, who served as respondents in the product readability test.

The development procedure was carried out in three stages. First, the analysis (Analyze) stage involved interviews with fourth-grade teachers to gather information on teaching practices and challenges in using instructional materials; a curriculum analysis to examine the alignment of the CP IPAS Phase B with the “Getting to Know Animals and Plants” content; and a needs analysis of students through a questionnaire to identify their learning interests and engagement with learning based on local wisdom. Second, the design (Design) stage involved creating a draft of the supplementary teaching material, which included a cover page, a preface, a table of contents, learning outcomes, a concept map, a content description, activity-based exercises, a summary, formative assessments, a glossary, a bibliography, and the developer’s profile. The supplementary teaching materials were designed using the Canva application in A5 (14.8 × 21 cm) print format on 80 gsm HVS paper in full color, and feature illustrations of animals and plants native to West Kalimantan, such as the hornbill, arowana, proboscis monkey, tengkawang tree, and belian tree. The practice questions were developed based on Bloom’s taxonomy at levels C3 (application), C4 (analysis), and C5 (evaluation). Third, the development stage involved creating a draft product, validation by subject matter experts, language experts, and design experts, revising the product based on validators’ suggestions, and testing the product’s readability with students.

The data collection techniques and tools used included interviews, questionnaires, and field notes. The subject matter expert validation questionnaire consisted of 5 aspects with 14 items; the language expert questionnaire consisted of 4 aspects with 12 items; the design expert questionnaire consisted of 4 aspects with 12 items; and the student readability questionnaire consisted of 5 aspects with 10 items. Each item was rated using a 1-to-5 Likert scale, as presented in Table 1.

Table 1. Likert Scale²⁰

Score Interval	Criteria
5	Very Good
4	Good
3	Fairly Good
2	Not So Good
1	Poor

Qualitative data in the form of critiques, comments, and suggestions from validators were analyzed descriptively to identify the product's strengths and weaknesses as a basis for revision. Quantitative data from expert validation were analyzed using the Borich formula to calculate the Percentage of Agreement (PoA), where $PoA = (1 - (A-B)/(A+B)) \times 100\%$, with A being the higher score given by the raters and B being the lower score given by the raters. The instrument was deemed valid if the PoA value was $\geq 75\%$. The resulting validity percentage was then compared with the product validity criteria according to Arikunto in Table 2.

Table 2. Product Validity Criteria²¹

Percentage (%)	Criteria
$80 \leq KP \leq 100$	Very Good
$60 \leq KP \leq 79$	Good
$40 \leq KP \leq 59$	Fair
$0 \leq KP \leq 39$	Not Good

²⁰Sugiyono, *Metode Penelitian Pendidikan (Pendekatan Kuantitatif, Kualitatif, dan R&D)* (Alfabeta, 2023).

²¹S. Arikunto, *Prosedur Penelitian: Suatu Pendekatan Praktik* (Rineka Cipta, 2018).

The product readability test aims to measure the extent to which instructional materials can be easily read, comprehended, and understood by students²². The readability survey data were analyzed using the percentage formula $P = (R/SM) \times 100\%$, where P is the percentage being calculated, R is the total raw score obtained, and SM is the maximum possible score. The resulting percentage was then compared to the readability test criteria in Table 3.

Table 3. Readability Test Criteria²³

Percentage (%)	Criteria
$80 \leq UK \leq 100$	Very Good
$60 \leq UK \leq 79$	Good
$40 \leq UK \leq 59$	Fairly Good
$0 \leq UK \leq 39$	Not Good

RESULTS AND DISCUSSION

Analysis Results

An interview with Ms. Nurpadilla, S.Pd., a fourth-grade B teacher at SD Negeri 42 Pontianak Kota, revealed that IPAS instruction has been going well; however, students tend to get bored quickly when lessons rely solely on textbooks. The instructional materials used including textbooks, worksheets, images, and educational videos are general in nature and do not yet include many examples relevant to the students' daily lives. The teacher emphasized the importance of integrating local wisdom so that students can understand material on animals, plants, and the environment through contexts they recognize in their daily lives. Interviews with three fourth-grade Class B students reinforced these findings: the students enjoy IPAS lessons because they relate to daily life and show interest in material on the environment, animals, plants, and local culture.

The results of the student needs analysis indicate that learning to date has still focused on school textbooks as the sole learning resource. A total of 91% of students stated they enjoy learning IPAS, while 28% admitted they had never studied Pontianak culture in those lessons.

²² D. Rahmawati dan Haryanto, "Analisis keterbacaan bahan ajar dalam pembelajaran di sekolah dasar," *Jurnal Pendidikan Dasar Nusantara* 6, no. 2 (2021): 145–56.

²³ Arikunto, *Prosedur Penelitian: Suatu Pendekatan Praktik*.

A total of 91% of students are interested in learning about Pontianak's culture, 88% are more enthusiastic about learning when West Kalimantan folktales are included, 78% prefer bright colors in teaching materials, and another 78% want the use of images, videos, or stories in their lessons. These data guided the researchers to develop IPAS learning resources on animals and plants that focus on the local wisdom of West Kalimantan.

An analysis of the curriculum for the IPAS Phase B Competency Standards (CP) under the Merdeka Curriculum revealed that students are expected to be able to describe biodiversity, cultural diversity, local wisdom, and conservation efforts. The textbook packages and worksheets used in schools already include basic concepts of animals and plants, but their presentation remains general and does not fully support these learning outcomes. Based on these findings, the required characteristics of the supplementary teaching materials include: (1) a visually appealing design, (2) content on local wisdom that is relevant to daily life, (3) relevant and engaging illustrations, (4) group-based activities, and (5) specific questions at the end of each lesson.

Design Phase Results

The instructional supplement was systematically designed following a structure that includes a front cover, instructions for use, a foreword, a table of contents, learning outcomes, a concept map, content descriptions, activity-based exercises, a summary, formative assessments, a glossary, a bibliography, and developer profiles. A summary of the design components is presented in Table 4.

Table 4. Summary of the Design Components of the Teaching Materials Supplement

Component	Content Description
Cover	The Merdeka Curriculum and Untan logos, the title of the supplement, the subject, the content, Grade 4 elements, and the developers' names
Table of Contents	Page layout accompanied by nature-themed margin illustrations
Concept Map	Visualization of the learning flow for learning about animals and plants
Learning Outcomes & Objectives	Formulation of IPAS Phase B learning outcomes relevant to the material
Content description	Introduction to animals and plants native to West Kalimantan, including their characteristics, body parts, bodily functions, and benefits
Exercises & Formative Tests	C3–C5-level questions based on local wisdom in the form of multiple-choice and short-answer questions
Summary, glossary, and bibliography	Summary of the material, key terms, and reference sources

Developer Profile

Identity and brief history of the product developer

The design integrates elements of local wisdom in the form of illustrations of endemic animals, such as the hornbill and the arowana, as well as plants native to the region, such as the tengkawang tree and aloe vera. Learning activities are designed to connect scientific principles with local cultural values for example, an introduction to traditional Dayak domesticated animals and the practice of cultivating medicinal plants native to West Kalimantan to hone critical thinking skills and foster a sense of environmental responsibility.

Results of the Development Phase

The supplementary teaching materials were developed according to the established design, using the Canva app in a full-color, A5-sized print format. Figure 2 shows the cover of the developed supplementary teaching materials, while Figure 3 displays an example of a content page that integrates animals and plants native to West Kalimantan.



Figure 2. Cover of the Local Wisdom Based Teaching Supplement



Figure 3. Example of a Content Description Page on Animals and Plants

The compiled product was then validated by six experts across three aspects content, language, and design with each aspect evaluated by two validators. A summary of the validation results is presented in Table 5.

Table 5. Summary of Expert Validation Results

Validation Aspect	Number of Items	Average Score of Validators A / B	PoA (%)	Category
Content (14 items, 5 aspects)	14	4.79 / 4.21	93.6	Highly Acceptable
Language (12 items, 4 aspects)	12	4.50 / 4.67	98.1	Highly Acceptable
Design (12 items, 4 aspects)	12	4.75 / 4.33	95.4	Highly Acceptable

The data in Table 5 show that all three validation aspects received a PoA score above the 75% threshold, so the instructional material supplement is deemed highly suitable for use. The validators provided several suggestions for improvement, including adjusting the learning objective pages to learning outcomes, adding supporting elements to the animal content such as the parts and functions of the hornbill's body, proboscis monkeys, tengkawang trees, and belian trees; standardizing the presentation template for the material; adjusting text density and line spacing; standardizing the font type throughout the instructional material; ensuring consistency in bold formatting; and adjusting terms in the glossary to make them more relevant

to the context of the material. All of this feedback was addressed through a revision process before the product was pilot-tested with students.

After being deemed suitable, the product was pilot-tested with 14 fourth-grade students in Class IV B at SD Negeri 42 Pontianak Kota to measure its readability. The pilot test results showed a readability percentage of 92%, which falls into the “very good” category, as summarized in Table 6.

Table 6. Summary of Product Readability Test Results

Number of Respondents	Readability Percentage	Category
14 fourth-grade B students	92%	Very Good

Field notes taken during the trial indicated that the students did not encounter significant difficulties in reading the instructional materials, although there were a few terms that required additional explanation from the researchers. The students were also able to complete the readability questionnaire well according to the provided instructions, and the material which was linked to their surrounding environment and local wisdom made it easier for them to recognize the examples of animals and plants being studied.

The Development Process of Teaching Material Supplements Based on Local Wisdom

The process of developing teaching material supplements in this study followed the ADDIE model, limited to the analysis, design, and development stages. During the analysis phase, the researcher gained a clear picture of the actual conditions of IPAS learning in the field, namely a reliance on textbooks and worksheets that had not yet fully integrated local wisdom. This finding aligns with the perspective of Rusdi that the ADDIE approach is systematic and ensures that the developed instructional materials are effective, efficient, and relevant to students' needs²⁴.

During the design phase, the supplementary instructional materials were designed with a focus on a complete structure of instructional components from the cover to the developer's profile and included engaging illustrations of local wisdom. This aligns with the view that engaging presentation of content, language, illustrations, and layout can enhance students' attention and interest in learning. The development stage was carried out by creating a complete product, which was then validated by subject matter experts, language experts, and design

²⁴ R. Rusinta, “Pengaruh desain visual bahan ajar terhadap minat belajar peserta didik sekolah dasar,” *Jurnal Pendidikan Dasar Nusantara* 5, no. 1 (2019): 45–56.

experts in line with the view of Tanjung and Dahnial, who state that validation is necessary to ensure the quality of the content, language, and presentation of the teaching materials. Through these three stages²⁵, a teaching supplement based on local wisdom was produced that meets students' needs, aligns with the requirements of the Merdeka Curriculum, and features examples of animals and plants native to West Kalimantan that are familiar to students' daily lives.

Feasibility of the Teaching Materials Supplement

Based on Ministry of Education, Culture, Research, and Technology Regulation No. 22 of 2022, the content aspect of instructional materials emphasizes scientific accuracy, alignment with the curriculum and the students' environmental context, and coherence among content sections. The results of the subject matter expert validation achieved a 93.6% score, falling into the "highly suitable" category. The validators assessed that the material aligns with the learning outcomes for Grade 4 IPAS, is organized sequentially from the introduction of animals and plants to exercises and assessments and is connected to the students' surrounding environment. The development of this material also draws on Dick and Carey's instructional design theory, which emphasizes that material must be systematically organized in accordance with learning objectives and student characteristics²⁶. These findings align with Kosasih, who states that the presentation of instructional materials must be able to stimulate interest in learning²⁷, as well as Putri, who state that instructional materials are considered valid if the content aligns with the development objectives and the needs of the students²⁸.

The language aspect received the highest suitability percentage, namely 98.1%, falling into the "highly suitable" category. The language in the instructional material supplement is composed of simple, clear, and communicative sentences tailored to the characteristics of elementary school students at the concrete operational stage. The validators assessed that the language used is appropriate for the students' developmental level and that the presentation of the material is coherent. These results align with Kosasih²⁹, who emphasizes that the language

²⁵ D. R. Tanjung dan I. Dahnial, "Pengembangan bahan ajar berbasis pendekatan saintifik pada siswa sekolah dasar," *Jurnal Riset dan Inovasi Pembelajaran* 4, no. 2 (2024): 994–1003, <https://doi.org/10.51574/jrip.v4i2.1874>.

²⁶ W. Dick dan L. Carey, *The systematic design of instruction* (Scott, Foresman and Company, 1978).

²⁷ Kosasih, *Pengembangan Bahan Ajar*.

²⁸ D. Putri dkk., "Validitas bahan ajar berbasis kontekstual pada pembelajaran sekolah dasar," *Jurnal Pendidikan Dasar* 13, no. 2 (2022): 120–31.

²⁹ Kosasih, *Pengembangan Bahan Ajar*.

in instructional materials must be simple, communicative, and effective, as well as with Ismail³⁰, who states that clear language can help students understand the material better.

The design aspect received a score of 95.4%, falling into the “highly suitable” category. The supplementary teaching materials feature illustrations of animals and plants native to West Kalimantan that are tailored to the students’ environment, and utilize pastel colors such as blue and green, which create a comfortable and calming atmosphere while reading. Nurfadillah state that color selection in learning media influences visual comfort, attention, and learners’ ease in understanding information³¹. The validators assessed that the cover design is attractive, the illustrations are relevant to the material, and the font size is easy to read, although they still provided suggestions for improvement regarding text density, line spacing, and font consistency. This aligns with Marlina³², who state that the graphic quality of instructional materials is determined by layout, typography, illustrations, and visual design consistency. These findings also reinforce the views of Kosasih and Rusinta that an attractive cover design and colorful illustrations can increase elementary school students’ interest in learning³³.

Readability of the Instructional Supplement

The readability test results showed a 92% score in the “very good” category, indicating that the instructional material supplement is easy for fourth-grade elementary school students to read and understand. This high level of readability is influenced by several factors. First, the use of simple language helps students understand the content without excessive cognitive load, in line with Schunk’s³⁴ view that information processing occurs more effectively when material is presented in accordance with students’ cognitive development levels. Second, an attractive visual design also contributes to readability, consistent with the aesthetic-usability effect principle proposed by Lidwell³⁵, which states that visually appealing designs tend to be perceived as easier to use. This is also consistent with the findings of Khairunnisa and Siregar,

³⁰ I. Ismail, “Penggunaan bahasa yang efektif dalam bahan ajar untuk meningkatkan pemahaman peserta didik,” *Jurnal Pendidikan Dasar* 12, no. 1 (2021): 45–54.

³¹ S. Nurfadillah dkk., “Pengaruh pemilihan warna terhadap kenyamanan visual dalam media pembelajaran sekolah dasar,” *Jurnal Pendidikan dan Teknologi Pembelajaran* 7, no. 1 (2025): 88–99.

³² R. Marlina dkk., “Analisis kelayakan kegrafikan bahan ajar pada pembelajaran sekolah dasar,” *Jurnal Inovasi Pendidikan* 12, no. 2 (2024): 145–56.

³³ Rusinta, “Pengaruh desain visual bahan ajar terhadap minat belajar peserta didik sekolah dasar”; Kosasih, *Pengembangan Bahan Ajar*.

³⁴ D. H. Schunk, *Learning theories: An educational perspective (6th ed.)* (Pearson Education, 2012).

³⁵ W. Lidwell dkk., *Universal principles of design (2nd ed.)* (Rockport Publishers, 2010).

who noted that the readability of instructional materials is influenced by clear visual design and layout³⁶.

Third, the selection of soft blue and green colors creates a calm and comfortable impression, thereby helping students focus better while reading consistent with the principles of visual consistency and user comfort proposed by Lidwell³⁷. Fourth, the use of contextual illustrations linked to the learners' local environment and culture reinforces their understanding, in line with Vygotsky's theory of social constructivism³⁸, which states that learning is more meaningful when new knowledge is connected to social and cultural experiences, as well as the "Funds of Knowledge" concept by Moll, which emphasizes the importance of learners' cultural backgrounds in the learning process³⁹. This finding also supports the results of a study by Malihah, which showed that teaching materials based on local wisdom received a very positive response because the content presented was closely aligned with students' cultural experiences⁴⁰. Fifth, the systematic organization of the material from concept introduction to summary also supports students' learning regulation, as proposed by Schunk⁴¹. Overall, the integration of appropriate language, attractive visual design, appropriate color selection, contextual illustrations, and systematic material organization results in a supplementary teaching resource that supports a more contextual and meaningful IPAS learning process.

This study has several limitations that need to be considered in its application and further development. Development was limited to a pilot test phase, so the product's effectiveness on student learning outcomes on a broader scale cannot yet be measured. The pilot test subjects were also limited to a single class, so the readability results cannot yet be generalized to the broader context of elementary schools. Additionally, producing instructional materials with color illustrations involves relatively high costs, which could pose a challenge for schools with limited budgets.

³⁶ N. Khairunnisa dan B. H. Siregar, "Pengembangan bahan ajar digital interaktif berbasis masalah untuk meningkatkan kemampuan pemecahan masalah matematis," *Jurnal Cendekia: Jurnal Pendidikan Matematika* 7, no. 2 (2023): 2104–17, <https://doi.org/10.31004/cendekia.v7i2.2125>.

³⁷ Lidwell dkk., *Universal principles of design (2nd ed.)*.

³⁸ L. S. Vygotsky, *Mind in society: The development of higher psychological processes* (Harvard University Press, 1978).

³⁹ L. C. Moll dkk., "Funds of knowledge for teaching: Using a qualitative approach to connect homes and classrooms," *Theory Into Practice* 31, no. 2 (1992): 132–41, <https://doi.org/10.1080/00405849209543534>.

⁴⁰ Malihah dkk., "Pengembangan bahan ajar berbasis kearifan lokal untuk meningkatkan keterlibatan peserta didik sekolah dasar."

⁴¹ Schunk, *Learning theories: An educational perspective (6th ed.)*.

Practical Implications and Comparison with Previous Studies

The findings of this study reinforce several results from previous studies regarding the benefits of integrating local wisdom into elementary school instructional materials. In line with Maharani and Muhtar , who state that learning based on local wisdom can enhance students' character, the pilot test results in this study also indicate that materials linked to the surrounding environment make it easier for students to recognize and appreciate the biodiversity of their region⁴². Wulandari and Nuraini as well as Sari further emphasize that local wisdom can serve as an effective source for contextualizing learning in elementary schools⁴³, as evidenced by the high percentages of suitability and readability of the supplementary teaching materials developed in this study.

In practical terms, the results of this study indicate that elementary school teachers can utilize teaching material supplements based on local wisdom to complement existing textbooks and worksheets, without needing to completely replace the primary learning resources. The use of examples of animals and plants unique to the region such as the hornbill, arowana, proboscis monkey, and tengkawang tree can serve as a bridge connecting the concept of biodiversity in the curriculum to students' daily experiences. This approach also opens opportunities for teachers to develop similar teaching materials for other IPAS topics, such as natural resources, ecosystems, or environmental conservation, while adhering to the principles of good instructional material design in terms of content, language, and layout, as outlined in Ministry of Education, Culture, Research, and Technology Regulation No. 22 of 2022.

CONCLUSION

Based on the results of the research and development, it can be concluded that the process of developing IPAS teaching materials supplements based on the local wisdom of West Kalimantan on the topic of "Getting to Know Animals and Plants" for fourth grade elementary school students was carried out using the ADDIE model, limited to the analysis, design, and development stages. The analysis phase revealed a need for contextual and engaging instructional materials, which was then translated into the design phase as a supplement themed

⁴² S. T. Maharani dan T. Muhtar, "Implementasi pembelajaran berbasis kearifan lokal untuk meningkatkan karakter siswa," *Jurnal Basicedu* 6, no. 4 (2022): 5961–68, <https://doi.org/10.31004/basicedu.v6i4.3148>.

⁴³ R. Sari, "Kontekstualisasi pembelajaran melalui kearifan lokal di sekolah dasar," *Jurnal Metodik Didaktik* 17, no. 2 (2021): 134–42, <https://jurnal.unimed.ac.id/2012/index.php/md/article/view/27634>; F. Wulandari dan L. Nuraini, "Kearifan lokal sebagai sumber belajar berbasis budaya dalam pembelajaran di sekolah dasar," *Jurnal Inovasi Pendidikan* 9, no. 2 (2021): 87–95.

around local wisdom featuring colorful visuals and simple language, and was implemented in the development phase through product creation, expert validation, and revision.

The feasibility rating of the developed teaching supplement falls into the “highly feasible” category, with approval rates of 93.6% from subject matter experts, 98.1% from language experts, and 95.4% from design experts. The content aspect was assessed as aligned with learning outcomes and students’ needs; the language aspect was deemed communicative and easy to understand; and the design aspect was considered appealing through the use of illustrations, layout, and color combinations suited to the characteristics of elementary school students. The results of the readability test conducted on 14 students showed a 92% rate in the “very good” category, indicating that the supplementary teaching materials are easy to understand and received positive feedback regarding their appearance, colors, illustrations, and the relevance of the content to the students’ daily lives.

Thus, the locally-based supplementary teaching materials featuring animals and plants native to West Kalimantan such as the hornbill, arowana, proboscis monkey, and tengkawang tree are suitable for use as a learning aid in IPAS to create a more contextual, engaging, and easily understandable learning experience for fourth-grade elementary school students. Further research is recommended to supplement the teaching materials with folk tales and environmental conservation practices in West Kalimantan, expand the scope of the biodiversity covered, add observation activities or environment-based projects, and continue the research through the implementation and evaluation stages to measure the effectiveness of the product on student learning outcomes more broadly and among a more representative sample of students.

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